NAVAL BIODYNAMICS LABORATORY
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EZFLOW DATA REDUCTION AND ANALYSIS SYSTEM

OPERATING PROCEDURES FOR THE HEWLETT PACKARD 9000/835 SYSTEM

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Software Documentation

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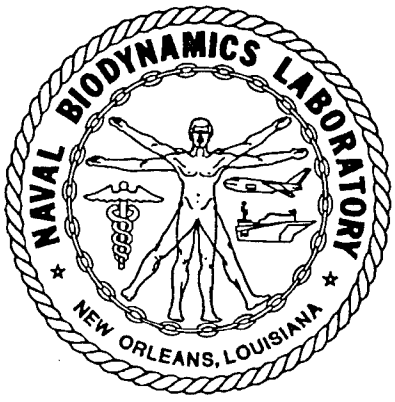

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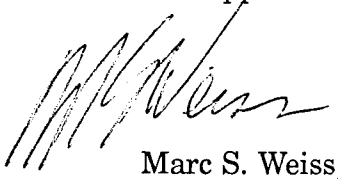

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13. ABSTRACT *(Maximum 200 words)*

A software package as developed for timely and efficient processing, analysis, and plotting of impact acceleration data. The package is called EZFLOW. This report documents procedures for executing EZFLOW on the HP 9000/835 computer. A description of the software is also presented.

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EZFLOW DATA REDUCTION AND ANALYSIS SYSTEM

OPERATING PROCEDURES FOR THE HEWLETT PACKARD 9000/835 SYSTEM

1. INTRODUCTION

The Naval Biodynamics Laboratory (NAVBIODYNLAB), located in New Orleans, Louisiana, is a research facility under the cognizance of the Naval Medical Research and Development Command. It is the only Navy laboratory conducting biomedical research on the effects of mechanical forces (motion and impact) encountered by Navy personnel. Among its goals are the establishment of human tolerance limits and the development of appropriate methods of avoiding and treating the deleterious effects of such forces. Ongoing research programs at the Laboratory acquire inertial (sensor) and photographic data from impact acceleration sled runs. Camera and X-ray anthropometry data are used in the reduction and analysis of impact acceleration data.

EZFLOW is a software package that was developed to facilitate the timely and efficient processing, analysis, and plotting of this data. EZFLOW processing involves the updating of databases and the orderly execution of several multitask computer programs. These programs use converted photographic and inertial data to compute and plot displacements, linear and angular velocity, and linear and angular acceleration of the subjects' head and neck.

Instructions for executing the EZFLOW programs are presented in the following pages. Detailed information on each of these programs is available in other publications or in program documentation (see "References," page 17).

2. GENERAL DESCRIPTION

EZFLOW uses four major types of data — anthropometry, photo constants, photographic, and sensor. Several independently executed programs maintain each type of data. Because they do not need to be executed every time EZFLOW is, the anthropometry and photo constants database programs will be discussed in separate documentation. The photographic and sensor data manipulation programs must be executed every time EZFLOW is and will be discussed in the section entitled, "Data Manipulation Programs."

Execution of the main EZFLOW programs proceeds in the following sequence:

1. Process sensor data. Execute the Sensor Reformat and Create Sensor Directory Programs.
2. Process photo data. Execute the Photo Convert Program.
3. PREEASY processing. The pre-processor program for the Hewlett Packard (HP) 9000/835 system is called PREEASY. All information pertaining to the run being processed is entered at this time by answering program-generated queries. Special case instructions (such as accelerometer exclusion, manual time record generation, and automatic camera switch) are entered via PREEASY. This program must be executed each time EZFLOW is executed.

4. Execute the following data manipulation programs:
   a. Photo Time Edit Program.
   b. Photo Interpolation Program.
   c. Photo Variables Program.
   d. Sensor Variables Program.

5. Execute the General Plot Program. Processing is interactive, with the program prompting the user for input as necessary. This program allows for the option of generating hard copy plots of all variables or plots of only velocity variables. DISSPLA graphic software is used to create metafiles containing the reproducible plots. The metafiles may be used to produce plots on any NAVBIODYNLAB graphic terminal (TK4014, TK4010, TK4107, HP2627A) and the HP7220 and HP7550 plotters.

3. MAIN EZFLOW PROGRAMS

3.1 DATA MANIPULATION PROGRAMS

There are two types of data manipulation programs - sensor and photographic.

3.1.1 Sensor Data Programs

The two major sensor data programs are as follows:

1. Sensor Reformat Program. This program reformats sensor data into the required format to be used in the next program. The input data is acquired on the HP9000/220 system and is transferred to the HP9000/835 via a network connection.
2. Create Sensor Directory Program. This program takes the reformatted sensor data and puts it into the directory structure necessary for input to the EZFLOW sensor variables programs.

3.1.2 Photographic Data Programs

1. Photo Conversion Program. This program converts digitized photo data acquired during impact experiments. The data is converted from NOVA 800 Photo Digitizing System (PDS) format to HP9000/835 format. This program also creates two sets of data plots per run. The first set tracks the position of the photo targets relative to the film frame origin (250 plots per mount). The second set tracks the entire X–Y filmplane trajectory for all targets on a mount (one plot per mount).
2. Photo Sign Change Program. PDS manual entries are stored as negative values on the PDS output tape. They remain negative after the conversion program to allow the plot program to identify them. The Photo Sign Change Program converts these values to positive and updates the photo data files.
3. Photo Time Edit Program. This program edits photo time records for PDS errors. Digitized and converted photographic data serve as input.
4. Photo Interpolation Program. This program interpolates photo data to align data with camera site 1. Edited data from the Photo Time Edit Program serves as input.

3.2 EZFLOW VARIABLES PROGRAMS

The two EZFLOW Variables programs are as follows:

1. Photo Variables Program. This program generates a set of parameters describing trajectories of anatomical bodies for human and human analog subjects and anthropomorphic dummies under high acceleration forces induced by a high-speed sled. Method of least squares is used to determine the position and orientation of the subject throughout an experimental run. Subject velocities are computed by differentiating position data. Interpolated data from the Photo Interpolation Program serve as input.
2. Sensor Variables Program. This program generates parameters describing trajectories of anatomical bodies, as well as transitional and rotational accelerations and velocities under high acceleration forces induced by a high speed sled. The least square method is used to determine kinematic variables of a rigid body from accelerometer measurements of six to nine accelerometers. Trapezoidal integration is used to generate sled velocity and displacement data. Sensor data serve as input.

4. OPERATING INSTRUCTIONS

This section is divided into three parts. The first contains procedures for direct processing of EZFLOW. The processing sequence is predetermined and the user is prompted for input. The second part explains how EZFLOW subprograms may be run independently. The third illustrates procedures for creating and maintaining the required files.

Executing EZFLOW on the HP is a multitask process. Anthropometry and photo constants files must be current, and photo and sensor data must be converted to EZFLOW format. Only then can the main program be executed to generate EZFLOW output data. A shell procedure has been developed to execute all programs required to produce these variables. The order of execution of the programs is determined by EZFLOW. Programs that do not require execution may be skipped (e.g., if sensor data has been processed, then sensor processing may be skipped).

In the following screen illustrations, all user responses are in bold. Unless otherwise indicated, keyboard input must be in lower case letters.

4.1 INTERACTIVE EZFLOW PROCESSING

A shell exists to run all EZFLOW subprograms in a logical sequence (listing in Section 5.) To begin EZFLOW execution, enter after the dollar sign prompt ($) the command "$runezflow" and the run identification number (RUNID) for the run to be processed (i.e., LX6455, LZ4567, etc.). The terminal screen should look like this:

```
$$runezflow LX6455
```

Examples of further EZFLOW screens and interactions are contained in the sections cited below for running EZFLOW subprograms independently. EZFLOW processing continues as follows:

1. The execution statement prompt will ask if the information is correctly entered. If you have entered the wrong information, you will be given the opportunity to restart the program.
2. A query will ask if sensor processing is required. If it is, the sensor programs will be executed. If not, this part of the program will be skipped and the user notified. To perform sensor data processing independently of the main EZFLOW program, refer to the section entitled, "Processing Sensor Data."
3. A query will ask if photo processing is required. If so, the photo conversion programs will be executed. If not, this part of the program will be skipped and the user notified. During the photo processing step, the data needed to produce target tracking plots will be saved. These are very time-consuming; they may be produced at this stage or at a later time. To process photo data outside of EZFLOW, see the section entitled, "Instructions to Convert Photo Data Input Tape."
4. The PREEASY program must be executed each time EZFLOW is used. All information pertaining to the run being processed is entered here. As the PREEASY program is executed, the user will be prompted for input. Most of the input is self-explanatory. After execution, the user will be given the option to stop or continue. To execute PREEASY outside of EZFLOW, see the section entitled, "Instructions to Set EZFLOW Pre-processor Parameters."
5. The EZFLOW data manipulation programs are executed next. They are as follows:
   a. Photo Time Edit Program.
   b. Photo Interpolation Program.
   c. Photo Variables Program.
   d. Sensor Variables Program.

To execute these programs independently of EZFLOW, see section 4.2.4 entitled "Instructions to Execute EZFLOW Variables Programs."

6. The EZFLOW output variable plots are done last. The user will be given the option to stop or continue. To produce output variable plots independently of EZFLOW, see the section entitled, "Instructions to Execute EZFLOW Plots."
7. Finally, the user will be notified that EZFLOW processing has been completed. This is usually after the completion of the plots.

4.2 INDEPENDENT EZFLOW PROCESSING

This section contains procedures for executing previously mentioned subprograms independently of the main EZFLOW shell. The following includes examples of the messages you will see displayed on the screen; appropriate replies are printed here in boldface type. Note that user input is usually in lower case.

4.2.1 Processing Sensor Data

To process sensor data independently of the complete EZFLOW program, sign on to the system using your password; then, after the dollar sign prompt, enter "$sensor", as in the following example:

```
$$sensor
```

This will begin execution of the Sensor Data Processing Program, which will prompt you to answer the questions necessary to reformat and create sensor directories on the HP. Caution must be exercised to ensure that all questions are answered correctly. To process any experimental run, sensor data must be loaded to the HP for EZFLOW processing.

```
STARTING SENSOR REFORMATTING PROCESS
CREATING ASCII DATA FILES
  Enter the beginning run number and # of runs
  to copy to disc. Format (A6,I3) END=To stop.
LX6125001
File /7963A/prod/LX6125 will be read.
```

Entering LX6125001 at the preceding prompt will cause the file '/7963A/prod/LX6125' to be read and reformatted ASCII data files to be created.

```
  Enter the beginning run number and # of runs
  to copy to disc. Format(A6,I3) END=To stop.
END
  OPENING FILE /7933/PROD/LX6125
STOP End Of Data

CREATING DIRECTORY FILES
  Enter the beginning run number and # of runs
  to copy to disc.  Format(A6,I3) END=To stop
LX6125001
```

Entering LX6125001 at the preceding prompt will cause the file '/7963A/prod/LX6125.ftdta' to be read and directory files to be created.

```
  File /7963A/prod/LZ0435.ftdta will be read.
  Enter the beginning run number and # of runs
  to copy to disc.  Format(A6,I3) END=To stop
END
 OPENING FILE /7963A/prod/LX6125.ftdta
STOP  END OF PROGRAM

COMPLETE SENSOR FILE REFORMATTING
```

Note that the input sensor files will be stored to the directory '/7963A/prod.' Reformatted sensor files will be stored in the same directory under the name '/7963A/prod/runid.ftdta,' where "runid" is the run identification number of the input experimental run. Similarly, sensor I/O formatted directory files will be stored in '/7933/prod/data/sensor/*runid*.'

4.2.2 Instructions to Convert Photo Data Input Tape

To convert photo data input tape, sign on to the system using your password, mount the tape on tape drive HP7914 (the photo tape is 800 bpi and tape drive HP7914 is the only drive that can read 800 bpi tapes) and place tape on line. After the dollar sign prompt, enter "$photo" and the run identification number as in the following example:

```
$$photo runid
```

This shell will copy and convert photo data tape to HP format. The following is an example of what will be displayed on the terminal screen while the Photo Data Conversion Program is running:

```
STARTING PHOTO CONVERT PROCESS
IS TAPE ON DRIVE? y
YOU ARE NOW ENTERING THE PHOTO DATA REDUCTION RUNSTREAM
BEGIN PHOTO CONVERSION PROGRAM
COPYING PLOT FILES
END OF PLOT FILES COPY
BEGIN SIGN-CHANGE PROGRAM
request id is lp1-xxxx (1 file)
OUTPUT SENT TO FILE 'out'
OUTPUT FILE 'out' SENT TO LINE PRINTER
OUTPUT SENT TO FILE photolog
YOUR JOB IS COMPLETE--CONTROL HAS BEEN RETURNED TO THE TERMINAL
```

If earlier outputs for this run are on the computer, you will get 2 error messages which include "cannot make directory" and "rm *.dat non-existent." Ignore these messages and continue to process the photo data. The converted photo data will be stored in the directory '/7933/prod/data/photoconvert.' The print files, will automatically be printed. To print additional copies of the print output file, use the line print ("lp") command followed by the name of the output file, as:

```
$lp /7933/prod/source/photoconvert/out
```

where **out** is the print file.

4.2.3 Instructions to Set EZFLOW Pre-processor Parameters

To set pre-processor parameters, sign on to the system using your password. After the dollar sign prompt, enter "$runpreez," as follows:

```
$$runpreez
```

The following is an example of what will be displayed on the terminal before the pre-EZFLOW program is executed.

```
THIS SHELL RUNS THE PREEASY PROGRAM.  THE PREEASY FILE MUST BE
CREATED BEFORE YOU CAN RUN THE PHOTO EDIT, THE PHOTO
INTERPOLATION, AND EZFLOW (PHOTO VARIABLES AND SENSOR
VARIABLES).
/7933/prod/source/photoedit
YOU ARE NOW IN THE DIRECTORY /7933/prod/source/photoedit
THIS IS WHERE THE preeasy FILE IS PLACED WHEN IT IS CREATED.
AS YOU ARE RUNNING preeasy, YOU WILL BE ASKED SEVERAL QUESTIONS
AFTER EACH QUESTION HAS BEEN ANSWERED AND THE RETURN KEY HIT
IT WILL APPEAR AS IF THE TERMINAL IS NOT RESPONDING TO YOUR
ANSWER.  IT IS WAITING FOR YOU TO CHECK YOUR ANSWER AND EITHER:
    1) Type an 'N', (which means your answer was wrong) and
       hit return.  It will then ask the question again.
                        OR
    2) Hit the return key without typing anything (this tells
       the program that your answer was correct).

  WHEN YOU ARE READY TO CONTINUE, PLEASE TYPE c. c
YOU ARE NOW STARTING startez
```

The following prompts will appear during execution of the pre-EZFLOW program if running with default selections. After each answer below you will notice a blank line, this represents hitting the return key, telling the program the answer typed in was correct. If after entering the answer, it is found to be wrong, type in **n** (for no) and the question will be repeated. Then type in the right answer and continue with the remaining questions.

```
 enter run number
LX1111
 LX1111

 enter run code (if human or manikin, hit return)
   blank = human (or manikin) impact run
   a = animal (rhesus) impact run
   f = human fast vol motion
   s = human slow vol motion
'blank'

 enter coordinate system (if anatomical return)
   blank = anatomical origin (default)
   cg = head data at cg origin
   in = instrumentation origin
'blank'


 enter sensor input code where:
   0 = sensor data available on disk
   1 = sensor data not available

0
0

do you want default selections for this run (hit return if yes)

y
```

If some of the default options need to be changed, then give a **no** answer to the above question, and the following prompts will appear:

```
 do you wish to exclude accelerometers from the inertial pgm
 (hit return if no)


 enter photo pgm debug print option (hit return for no debug
print)
   0 = no debug print (default)
   1 = detailed debug print
   2 = less detailed debug print

 0
  0
```

```
 do you wish to enter any sprocket holes manually ? (hit return
if no)

y

 enter x sprocket hole value for cam 1, return if not required
146.11
    146.1100

 enter y sprocket hole value for cam 1, return if not required
88.56
    88.5600

 enter x sprocket hole value for cam 2, return if not required
39.28
    39.2800

 enter y sprocket hole value for cam 2, return if not required
88.64
    88.6400

 enter x sprocket hole value for cam 3, return if not required
35.34
    35.3400

 enter y sprocket hole value for cam 3, return if not required
94.43
    94.4300

enter photofudge option:
   0 = no photofudge (animal default)
   3 = photofudge (human default)

 3
 3

 enter photo edit option for mouth mount:
   0 = no edit (animal default)
   1 = edit with severe criteria
   2 = edit with less severe criteria (human default)
   4 = edit with least severe criteria

2
2

 enter photo edit option for neck mount:
   0 = no edit
   1 = edit with severe criteria
   2 = edit with less severe criteria
   3 = special edit criteria (human default)

3
3
```

```
do you wish to enter manual camera corrections ?
(hit return if no)


do you wish to specify cameras to begin photo
calculations with ? (hit return for default cameras)


enter auto camera switch option:
   0 = auto camera switch (animal default)
   1 = no camera switch (human default)

1
1
```

In either of the above cases, the following screen will appear next. The numbers may change depending on the options chosen. The example screen below comes from choosing the default selections.

```
complete run information follows

run LX1111 scode   coord syst
sprock holes       .0000       .0000       .0000       .0000
.0000       .0000       .0000       .0000
phot fudg 3 mouth edit 2 neck edit 3 sled corrs 0 0 0 0
acc corrs 0 0 0 0  phot print 0 no. cam corrs 0
cams for calc 0 0 0 0 0 0 0  cam switch 1 mouth constr 0
alt sensor 0 photo dir  9 sensor dir  8
```

After complete run information has been displayed on the screen, the following prompts will appear:

```
is this the last run, type n for no, else return

 ..... normal completion rngen .....
END OF PREEASY PROGRAM
```

Note the 'runpreez' shell is stored in the directory '/7933/prod/source/runez' and 'startez,' the main program, is in the directory '/7933/prod/source/ezdriver.' Output from the pre-EZFLOW program is in a file called 'preeasy', located in the directory '/7933/prod/source/photoedit.' The 'preeasy' file contains information, needed to execute EZFLOW variables programs (see the next section).

4.2.4 Instructions to Execute EZFLOW Variables Programs

At this point of the application all photo, sensor, and pre-processor data have been formatted for use on the HP. This shell will produce EZFLOW output data. Enter "$ezflowvar" and the run identification number in the following format:

```
$$ezflowvar runid
```

1. The first subshell to be executed is the Photo Time Edit Program shell - 'xqtedit.' This program is designed to validate and correct, when necessary, any errors which may exist on the time records, for all camera sites, of a given experiment or run. Note input to time edit program is converted photo data in HP9000/835 photo format. Output is in the exact same format as input, the only difference being the edited time records for each camera site. Processing control is maintained by reading control statements from the 'preeasy' file. The control statement contains the run number which tells the program which run to process. It is also used to denote special processing consideration such as running in instrumentation coordinate system as well as a source of input when the sprocket hole information is not on the data tape. The sensor file is also needed because it contains the time of first motion. File '8' should contain the full path name of the directory containing the sensor data, '/7933/prod/data/sensor.' File '9' should contain the full path name of the directory containing the photographic data, '/7933/prod/data/photoconvert.' The print file can be found in '/7933/prod/source/photoedit/outedit.'

Provisions are incorporated for two manual corrections. First, in cases of an incorrect first time being digitized, the first time can be entered manually and the program will calculate a delta time and proceed with normal time editing. secondly, in cases where the first time is bad or no first time is digitized and a delta time cannot be validated, a first time and delta time is input manually and a time record generated. For more detail, on the Time Edit Program and manual corrections, see reference 1.

2. The second subshell is the Photo Interpolation Program shell 'xqtinterp.' This program is designed to align multiple camera photo data to agree with a single camera time record. Note that the file '/7933/prod/source/photoedit/preeasy' and the edited photo data in directory '/7933/prod/data/photoconvert' are needed as input to the Photo Interpolation Program. This directory name is stored in file '9.' The directory '/7933/prod/data/photointerp' is needed as output, and its directory name is stored in file '2.' The print file can be found in '/7933/prod/source/photointer/interpout.' For more detail, on the Interpolation Program, see reference 2.

3. The last subshell in this process is 'runboth,' which executes the Photo and Sensor Variables Programs. The following files are needed as input to the Photo Variable Program: '/7933/prod/source/photoedit/preeasy,' '/7933/prod/data/sensor,' '/7933/prod/source/anthopometry/anthofile,' '/7933/prod/data/photointerp,' and the camera constant files '/7933/prod/source/photocon.' The following files are needed as input to the Sensor Variable Program: '/7933/prod/source/photoedit/preeasy,' '/7933/prod/data/sensor,' '/7933/prod/source/anthropometry/anthofile,' and the photo files created in the photo variables program, which are stored in the directory '/7933/prod/data/plotdata.'

The screen output will be as follows:

```
/7933/prod/source/photoedit

BEGIN PHOTO EDIT PROGRAM
ENTER LP OUTEDIT TO RECEIVE OUTPUT
END OF PHOTO EDIT PROGRAM

OUTPUT SENT TO PRINTER
request id is lp1-983 (1 file)
BEGIN PHOTO INTERP PROGRAM
END OF PHOTO INTERP PROGRAM

OUTPUT SENT TO PRINTER
request id is lp1-984 (1 file)
/7933/prod/source/runez
START OF PHOTO VARIABLE PROGRAM
SELECT RUN TYPE 1 FOR VERTICAL 2 FOR HORIZONTAL
1
END OF PHOTO VARIABLES PROGRAM
START OF SENSOR VARIABLE PROGRAM
END OF SENSOR VARIABLE PROGRAM
OUTPUT SENT TO PRINTER
request id is lp1-985 (1 file)

END OF EZFLOW RUN
```

4.2.5 Instructions to Execute EZFLOW Plots

To generate plots, sign on to the system using your password. After the dollar sign prompt, enter "$plot1," as follows:

```
$$plot1
```

The user will be prompted to enter the information necessary to generate plots. The shell is stored in the directory '/7933/prod/source/runez.' The plotting options are listed on the screen as follows:

```
/7933/prod/source/runez

1. TO PLOT 1 RUN ALL VARIABLES TO PLOTTER
2. TO PLOT 1 RUN ALL VARIABLES TO SCREEN
3. TO PLOT 1 RUN VELOCITY PLOTS TO PLOTTER
4. TO PLOT 1 RUN VELOCITY PLOTS TO SCREEN
5. TO PLOT TARGET TRACKING PLOTS TO PLOTTER

ENTER CHOICE (1-5) 3
ENTER RUN NUMBER LX1111
```

Several screens of status information will be displayed as follows:

```
COPYING PLOT FILES

END OF PLOT FILES COPY
BEGIN PLOT SPECIFICATION DEFINITION
(Several screens of information will be printed)
END OF PLOT SPECIFICATION DEFINITION
BEGIN PLOT PROGRAM
END OF PLOT PROGRAM
BEGIN POP PROGRAM
```

Printed information will appear on the screen.

```
END OF POP PROGRAM

SENDING PLOT DATA TO PLOTTER
```

Plots will now be generated on the plotter.

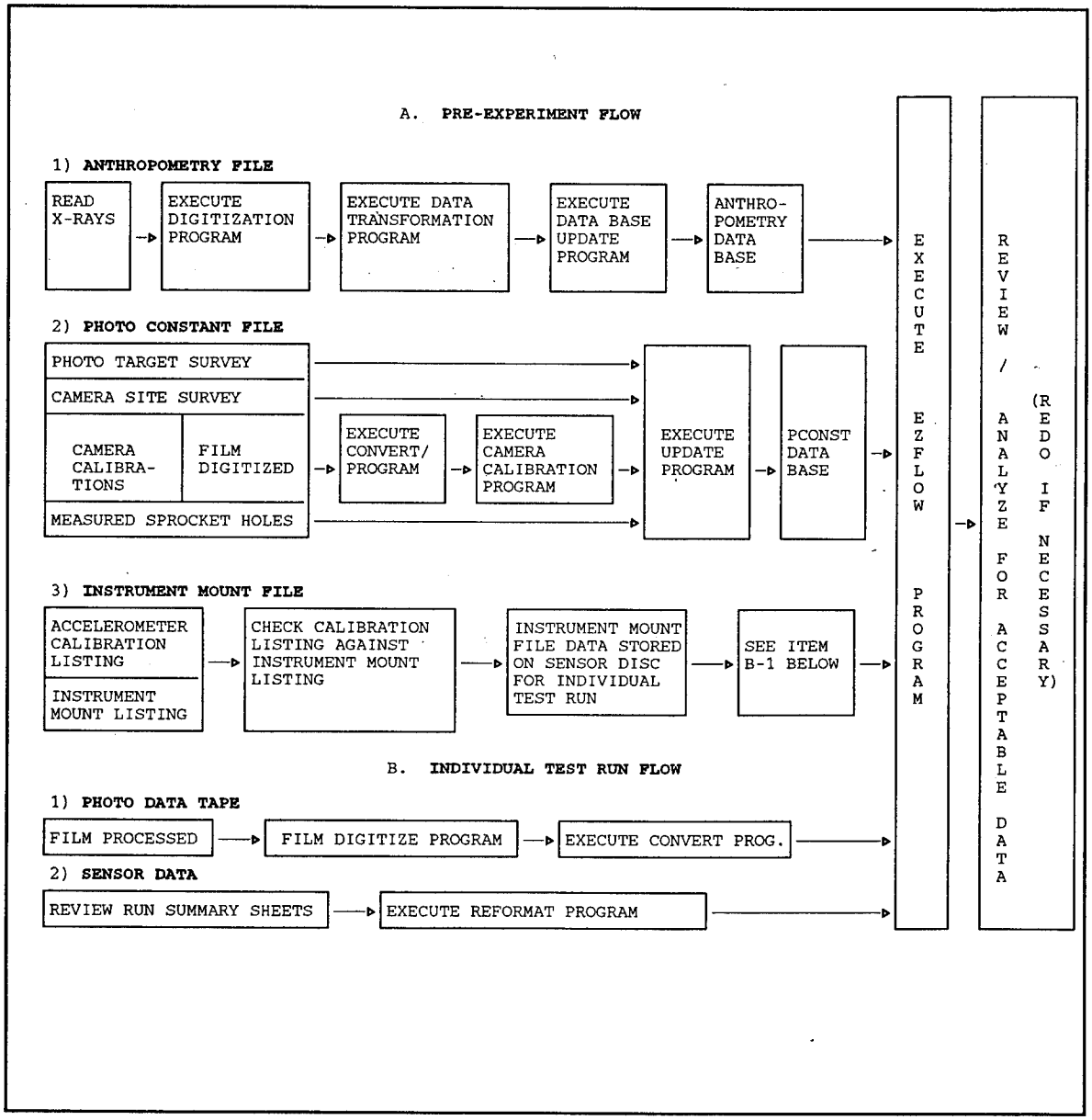
```
PLOT DATA SENT TO PLOTTER
```

5. SHELL PROCEDURE TO PROCESS EZFLOW INTERACTIVELY

```
# FILE NAME -- /7933/prod/source/runez/runezflow
#
# SHELL TO PROCESS EZFLOW - COMPLETE EZFLOW PROCESSING
#
echo 'THIS SHELL ALLOWS THE USER TO PROCESS THE EIGHT MAIN'
echo 'PHASES OF EZFLOW - SENSOR CONVERSION; PHOTO CONVERSION; PREEASY;'
echo 'PHOTO EDIT; PHOTO INTERPOLATION; PHOTO VARIABLES; SENSOR VARIABLES;'
echo 'AND VELOCITY PLOTS.'
#
echo 'THE USER MAY DO ALL OR PART. THE FILES SHOULD BE UP-TO-DATE.'
#
bell
echo 'BEGINNING EZFLOW PROCESSING'
bell
echo 'DID YOU TYPE IN "$runezflow LXNNNN"? (y=yes;n=no)'
read ANS
if ["$ANS" = "n"]; then echo 'RUN TERMINATED - TRY AGAIN';
exit; fi
#
# SHELL TO RUN SENSOR PROGRAM
bell
echo 'DO YOU NEED SENSOR PROCESSING? (y=yes;n=no)'
read ANS
if test "$ANS" = "y"
then
cd $sensordir
#
echo "CREATING ASCII DATA FILES"
hp200convert
echo
echo "CREATING DIRECTORY FILES"
createdir
else
bell
echo 'NO SENSOR PROCESSED'
echo
fi
echo 'DO YOU WISH TO CONTINUE? (y=yes;n=no)'
read ANS
if ["$ANS" = "n"]; then exit; fi
#
#SHELL TO CONVERT PHOTO TAPE
bell
echo 'DO YOU NEED PHOTO PROCESSING? (y=yes;n=no)'
read ANS
if test "$ANS" = "y"
then
echo "STARTING PHOTO CONVERT PROCESS"
bell
echo 'IS TAPE ON DRIVE? \c'
read ANSWER
#TEST FOR ANSWER
if test "$ANSWER" = "y"
then
cd $photoconvert
```

```
#TEST FOR ALL PLOTS
convertonly $1
else
echo 'TAPE MUST BE MOUNTED ON DRIVE'
fi
else
bell
echo 'NO PHOTO PROCESSED'
echo
fi
echo 'DO YOU WISH TO CONTINUE? (y=yes;n=no)'
read ANS
if ["$ANS" = "n"]; then exit; fi
#
# SHELL TO RUN THE PREEASY PROGRAM
#
# PREEASY MUST BE EXECUTED EACH TIME EZFLOW IS EXECUTED
cd $photoedit
rm pltsave pltsave2
$startez
echo 'END OF PREEASY PROGRAM'
#
bell
echo ' LAST CHANCE TO EXIT EZFLOW PROCESSING'
echo 'ARE ALL DATA BASES UP TO DATE?'
echo ' DO YOU WISH TO CONTINUE? (y=yes,n=no)'
read ANS
if ["$ANS" = "n"]; then exit; fi
#
# SHELL TO RUN THE EZFLOW PROGRAM.
#
#EXECUTE PHOTO TIME EDIT AND INTERPOLATION PROGRAMS
$pheditinterp
cd $runez
pwd
runboth $1
bell
echo 'DO YOU WANT TO PLOT NOW? IS THE PLOTTER FREE? (y=yes;n=no)'
read ANS
if ["$ANS" = "n"]; then exit; fi
plot1
bell
echo 'END OF EZFLOW RUN'
```

6. IMPACT EXPERIMENT DATA FLOW



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